

Claims

- [c1] 1. A method for manufacturing a photomask, comprising steps of:
 - forming an opaque layer on a substrate;
 - forming a resist layer on a portion of the opaque layer; and
 - etching the opaque layer by using a gas mixture having a selectivity approximately equal to or higher than 1.2:1 between the opaque layer and the resist layer.
- [c2] 2. The method of claim 1, wherein the gas mixture comprises Cl, He, O and C.
- [c3] 3. The method of claim 2, wherein the gas mixture comprises Cl₂, He and CO or CO₂.
- [c4] 4. The method of claim 3, wherein a ratio of the gas mixture among Cl₂, He and CO or CO₂ is 4:1:1.
- [c5] 5. The method of claim 1, wherein the gas mixture comprises Cl, He, O and N.
- [c6] 6. The method of claim 5, wherein the gas mixture comprises Cl₂, He and NO or NO₂.
- [c7] 7. The method of claim 6, wherein a ratio of the gas mixture among Cl₂, He and NO or NO₂ is 4:1:1.
- [c8] 8. The method of claim 1, wherein the gas mixture comprises Cl, He, O and S.

- [c9] 9. The method of claim 8, wherein the gas mixture comprises Cl₂, He and SO₂.
- [c10] 10. The method of claim 9, wherein a ratio of the gas mixture among Cl₂, He and SO₂ is 4:1:1.
- [c11] 11. The method of claim 1, wherein the gas mixture comprises Cl₂, He and O₃.
- [c12] 12. The method of claim 11, wherein a ratio of the gas mixture among Cl₂, He and O₃ is 4:1:1.
- [c13] 13. The method of claim 1, wherein the gas mixture comprises Cl₂, CO₂ and O₂.
- [c14] 14. The method of claim 13 wherein a ratio of the gas mixture among Cl₂, CO₂ and O₂ is approximately 2:1:0.25.
- [c15] 15. The method of claim 1, wherein the opaque layer is Cr, a Cr compound, an Mo alloy or W.
- [c16] 16. The method of claim 1, wherein the substrate is a transparent material.
- [c17] 17. The method of claim 1, further comprising a step of forming a reflection prevention layer on the opaque layer.
- [c18] 18. The method of claim 15, wherein the reflection prevention layer is an oxide of the opaque layer.
- [c19] 19. The method of claim 1, wherein the resist is a light-sensitive material.

- [c20] 20. A photomask comprising a substrate and an opaque layer selectively formed on the substrate, the mask manufactured by steps comprising:
 - forming the opaque layer on the substrate;
 - forming a resist layer on a portion of the opaque layer; and
 - etching the opaque layer by using a gas mixture having a selectivity approximately equal to or higher than 1.2:1 between the opaque layer and the resist layer.
- [c21] 21. The photomask of claim 18, wherein the gas mixture is selected from a group consisting of a gas mixture comprising Cl, He, O and C, a gas mixture comprising Cl, He, O and N, a gas mixture comprising Cl, He, O and S, and a gas mixture comprising Cl, He and O₃.
- [c22] 22. The photomask of claim 19, wherein the gas mixture is one selected from a group consisting of a gas mixture comprising Cl₂, He and CO or CO₂, a gas mixture comprising Cl₂, He and NO or NO₂, a gas mixture comprising Cl₂, He and SO₂, and the gas mixture comprising Cl₂, He and O₃.